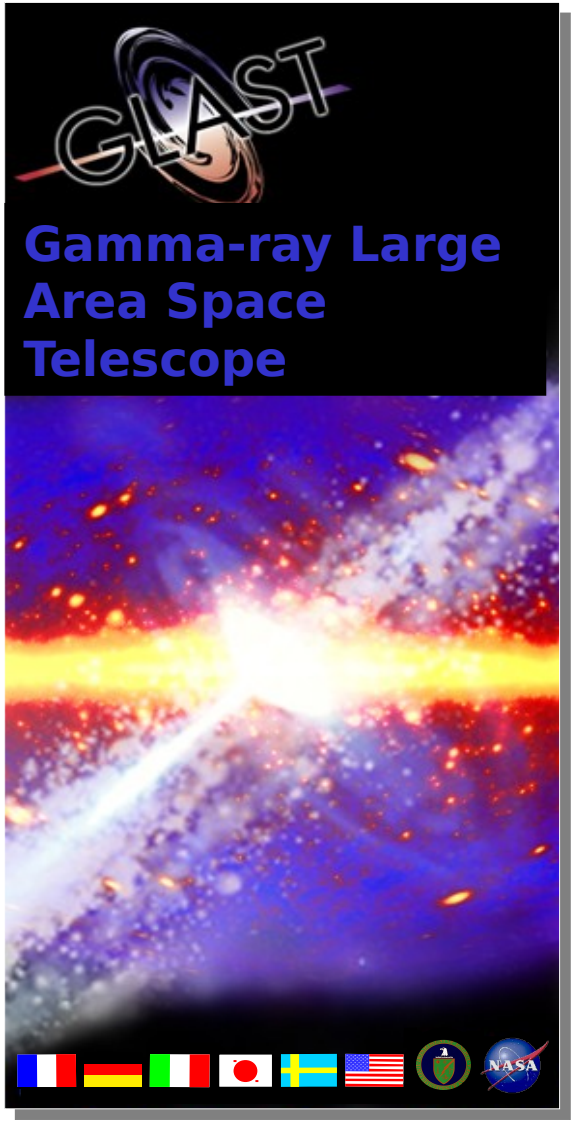

GLAST Large Area Telescope
Calorimeter Subsystem
13.0 Summary

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Outline

- Risk Assessment
- Summary

CAL Risk Summary

ID #	Risk Rank	Risk Description	Risk Mitigation
CAL-001	Moderate	❑ CAL ASIC performance problem. All design and manufacturing issues are not resolved. Testing with GCFE8 and GCRC4 indicate 1) continued communications problems which prevent 200 MHz communication speed at environmental margins (high temp) 2) noise performance variability as a function of pulse amplitude in some FE chips which appears related to individual FE parts but could also be PCB problem	❑ New ASICs have been submitted that should correct the communications problem. Available for test by end of April ❑ Noise problem has been identified and corrected in GCFE9 wafer submission. Sample testing possible by end of April. Alternative fix requires resistor addition to AFEE board for each GCFE8 Versiom
CAL-002	Low	❑ Failure in qualification of COTS ADC/DAC. CAL requires ~ 3500 plastic encapsulated ADCs and 300 DACs ❑ There are no options to the COTS ADC/DAC which meet LAT power and deadtime requirements	❑ Potential ADCs & DACs were radiation tested prior to final part identification ❑ Flight parts are expected in four weeks and we will perform initial quick qual ❑ Selected Maxim ADC and DAC were tested for radiation susceptibility over a year ago. Qualification testing is a repeat ❑ A qualification program has been developed and approved by GSFC

CAL Risk Summary (1)

ID #	Risk Rank	Risk Description	Risk Mitigation
CAL-003	Low	❑ Failure in qualification of plastic encapsulation of flight ASICs. Asics designs have not been tested to qual level so far	❑ Using earlier version of ASICs packaged by proposed flight vendor we have initiated plastic encapsulated module evaluation with GSFC. Acoustic microscopy, HAST testing has been performed ❑ Qualification program has been developed and approved by GSFC.
CAL-004	Very High	❑ Delay in deliveries of flight CDEs ❑ Our French collaborators are in the middle of a competitive procurement for the industrial partner that will fabricate all flight CDEs. The procurement process must follow French law and is potentially subject to the delay of administrative reviews ❑ The selected industrial partner must design and fabricate appropriate tooling, develop controlled manufacturing process, fabricate and qualify CDE prototypes, and then fabricate 108 CDE for the CAL Qual model by mid August, 2003	❑ A higher CDE manufacturing rate is an option to the French contract but may present financial and technical risks. The higher rate would deliver the later modules on schedule. ❑ A supplemental vendor of CDEs appear to be one option for maintaining the baseline schedule for the first modules. This presents the problem of qualifying CDEs from more than one source.

CAL Risk Summary (2)

ID #	Risk Rank	Risk Description	Risk Mitigation
CAL-005	Moderate	❑ CAL module subsystem performance problem detected in EM module test program ❑ The CAL EM is the first opportunity for subsystem level testing of module performance. Issues such as noise, cross talk and correlation of measurements at two ends of CDE will be examined in detail for the first time	❑ Testing at the AFEE board level with prototype boards and earlier version of ASICs give some confidence. However, problems were identified that could be related to PCB board layout or ASIC design problems ❑ Accelerator beam testing of the assembled calorimeter is the best confidence test for the calorimeter electronic design. The schedule puts the calorimeter beam test after flight circuits have begun fabrication. Mitigation for electronic problems determined at beam tests is severe
CAL-008	Low	❑ CAL AFEE board design, SMT manufacturing, testing, PEM assembly and qualification issues still to be resolved, since these processes have not been validated so far	❑ Remaining EM boards will be fabricated using SMT processes and we will analyze any issue related to design, layout and manufacturing. ❑ Prior to start of flight manufacturing, assembly processes and procedure will again be validated.

Summary

- **The technical design of the CAL module is mature and verified**
  - **Most outstanding issues will be retired at the completion of EM test program in June**
  - **New PIN photodiode verification will complete as well in June**
  - **Updated ASIC versions will be verified in April**
  - **Essentially all documents will be released before CDR**
- **The CAL schedule is aggressive in meeting all Level 3 milestones with appropriate schedule contingency**
  - **Recently discovered problem in deliveries of CDE will be resolved to meet the baseline schedule**
- **CAL is ready for flight production**
  - **Technical risks are minimal**
  - **Schedule risk will be resolved**